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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,786	02/12/2001	Kyung-Ju Choi	00-6AAF (DN7814)	6972
27868	7590	09/08/2004	EXAMINER	
JOHN F. SALAZAR MIDDLETON & REUTLINGER 2500 BROWN & WILLIAMSON TOWER LOUISVILLE, KY 40202			CECIL, TERRY K	
			ART UNIT	PAPER NUMBER
			1723	

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/781,786	<b>Applicant(s)</b> CHOI, KYUNG-JU
	<b>Examiner</b> Mr. Terry K. Cecil	<b>Art Unit</b> 1723

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-27 and 29-45 is/are pending in the application.
- 4a) Of the above claim(s) 19-27 and 29-45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

Art Unit: 1723

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 12-13 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form. It is not seen how an equation that approximates the mean flow pore diameter or the air frazier permeability of the multilayer filter media further limits the structure thereof.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 3, 5-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the publication entitled Air Permeability and Pore Distribution of a Dual-Layered Microglass Filter Medium in Vol. 6 of Advances in filtration and Separation Technology of the AFS Society 97-99 (1994), hereinafter "The A-P Reference" in view of Ichihara et al. (U.S. 4,093,437). The A-P

Art Unit: 1723

Reference teaches a coarse fiber thickness layered against a fine fiber thickness and arranged such that the overall average pore size is smaller than the pore size of the finest layer (as in claim 1). This is shown in figure 1. As for claim 6, the media would be separate face-to-face thicknesses since the filter is a "dual-layered" type. The A-P reference does not teach each of the thicknesses being comprised of selected filter fiber of differing denier sizes. However, such is taught by Ichihara (col. 2, lines 33-55) [as in claims 1 and 11]. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the layers of the A-P reference to have selected fiber of differing denier sizes as in Ichihara, since Ichihara teaches the benefits of improved dust holding capacity and air filter efficiency and high mechanical strength. The way in which the fiber sizes and pore sizes are calculated fail to further structurally limit the multi-layered filter media beyond the structural requirements that (i) the overall average pore size of the combined layers is smaller than that of the finest fiber thickness and (ii) each layer is comprised of fibers of differing deniers.

As for claim 3, layer 1 includes fibers 6d or larger and layer 3 includes fibers less than 6d; and, as for claim 5, the multi-layer structure is integral (col. 1, line 50).

As for claims 6-10, a thermosetting resin, e.g. an acrylic chemical resin is used to bind the layers of Ichihara together.

Art Unit: 1723

As for claims 12 and 13, the equations developed by the applicant to describe the mean flow pore diameter and the air frazier permeability of a multiple layered filter product would also apply to the filter of A-P, as modified by Ichihara.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P Reference in view of Ichihara, as applied to claim 1 and in further view of Cusick et al. (U.S. 5,800,586).

Claim 2 has the limitation of the fibers being carded and chopped and substantially opened and aligned. As shown in figure 11, Cusick teaches carding of fibers to form an open and aligned layer. As in the applicant's specification, carding results in opened and aligned fibers (page 15, lines 1-4). It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention have the layers of the A-P Reference in view of Ichihara to be carded as in Cusick, since Cusick teaches the benefit of forming composite filter media sheets in an economical manner (col. 1, line 43). Both Ichihara and Cusick teach fibers of a desired length such that chopping the fibers to the desired length before forming the filter layers is within ordinary skill.

5. Claims 4, 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P reference in view of in view of Ichihara, as applied to claim 1 and in further view of De Villiers.

Claim 4 has the limitation of each filter thickness including fibers of three different specific deniers. Claims 14-17 have limitations concerning the length and percentage of denier sizes for the filter fibers. De Villiers teaches using a combination of low melt and regular fibers approximately 1-2 inches and of various fine, intermediate and coarse denier fiber sizes and

Art Unit: 1723

percentages. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the combination of fibers of De Villiers in the invention of the A-P reference, as modified by Ichihara, since DeVilliers teaches the benefit of increased rigidity and stability (col. 5, lines 45-50). It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the specific sizes and percentages as in claims 4 and 14-17 since De Villiers teaches that the “relative percentages and components and fibers...will determining the performance of the efficient layer and will be selected bearing the desired characteristics in mind.” The percentages would be chosen depending upon the intended use. It would also be obvious to optimize the denier size of the fibers depending upon the specific environment, type of liquid etc. in which the filter will operate in—as taught by De Villiers et al. (U.S. 5,480,464) at col. 5, lines 10-16 and as also realized by the applicant (page 8, lines 18-20).

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P reference in view of Ichihara, Cusick and De Villiers. The A-P reference in view of Ichihara and Cusick has been expanded above and teaches all the limitations of claim 18 except for the three difference deniers for each layer of a specific value. As explained above, De Villiers teaches a fiber layer with three different deniers and that it is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the specific sizes as in claim 18, since De Villiers teaches that the “relative percentages and components and fibers sizes...will determine the performance of the efficient layer and will be selected bearing the desired characteristics in mind.” The specific deniers and number of deniers would be chosen

Art Unit: 1723

depending upon the intended use. It would also be obvious to optimize the denier size of the fibers depending upon the specific environment, type of liquid etc. in which the filter will operate in—as taught by De Villiers et al. (U.S. 5,480,464) at col. 5, lines 10-16 and as also realized by the applicant (page 8, lines 18-20).

Also, the way in which the fiber sizes and pore sizes are calculated fail to further structurally limit the multi-layered filter media beyond the structural requirements that (i) the overall average pore size of the combined layers is smaller than that of the finest fiber thickness and (ii) each layer is comprised of fibers of differing deniers. Also, the equations developed by the applicant to describe the mean flow pore diameter and the air frazier permeability of a multiple layered filter product would also apply to the filter of A-P, as modified by Ichihara.

### ***Response to Arguments***

7. Applicant's arguments in the amendment of 3-2-2004 have been fully considered but are unpersuasive. Concerning the "calculated" overall average pore size, applicant's specification states the following (in the amendment filed 7-14-2003):

When a designer is developing a multi-layer filter media, the designer initially chooses a desired overall average pore size for the combined layers. By using the formulas for average pore size (equation 5) and air frazier permeability (equation 6), the designer can determine or calculate the average pore size for the individual layers necessary to introduce the multi-layer filter media having the desired overall average pore size. The fibers for the different layers can then be chosen, and the fibers can be processed and bonded to form the different layers to have the determined or calculated average pore size for the different layers. Thus, when the different layers are arranged as face-to-face thicknesses, the combined layers (or the multi-layer filter media) will have an overall average pore size which substantially approximates the desired overall average pore size. This eliminates a substantial amount of experimentation which would otherwise be

Art Unit: 1723

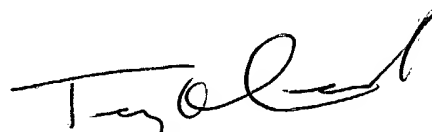
needed by the designer to develop a multi-layer filter media which has a desired overall average pore size.

The calculations involved in applicant's invention, enable the applicant to produce a multi-layered filter media having a *desired* overall average pore size. But the resulting filter product produced is not unobvious in view of the applied prior art. The filter media of applicant's invention (for example of claim 1) requires a multi-layer filter of at least two layers. Both layers have fibers of differing denier sizes. One layer has finer fibers and a smaller average pore size than the other layer. The filter media also requires that the overall average pore size be even smaller than the layer of finer fibers. Looking to the prior art of the A-P reference, the table 1 therein clearly teaches a bottom layer of finer medium having a mean (average) pore diameter (size) (18.20) that is smaller than that of the courser top layer (22.85)—as in the applicant's invention. Furthermore, it is clearly shown that the MFP of the overall medium is even smaller (13.39) than the finer medium (18.20)—as in the applicant's invention. Ichihara, as shown in the rejection above, teaches each layer being comprised of selected filter fiber of differing denier sizes—as in the applicant's invention. The reasons given in Ichihara, including improved efficiency and high mechanical strength, provide sufficient motivation for combining the references. The examiner contends that the WAY in which the applicant arrives at his filter product, does not structurally differentiate his resulting filter product from that of the prior art—and that such is more conducive to a METHOD invention. The examiner contends that all the structural limitations of the claimed invention have been shown to be in the prior art and that a prima facie case of obviousness has been presented.



8. Contact Information:

- Examiner Mr. Terry K. Cecil can be reached at (571) 272-1138 at the Carlisle campus in Alexandria, Virginia for any inquiries concerning this communication or earlier communications from the examiner. Note that the examiner is on the increased flextime schedule but can normally be found in the office during the hours of 8:30a to 4:30p, on at least four days during the week M-F.
- Wanda Walker, the examiner's supervisor, can be reached at (571) 272-1151 if attempts to reach the examiner are unsuccessful.
- The Fax number for this art unit for official faxes is 703-872-9306.
- Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Mr. Terry K. Cecil  
Primary Examiner  
Art Unit 1723

TKC  
September 2, 2004